

What we claim is:

1. A method of fabricating a liquid crystal display device, comprising:

5 forming on a first substrate a common electrode for applying a voltage over an entire surface of the substrate;

10 forming on a second substrate a gate bus line and a data bus line arranged in a matrix array, a thin-film transistor located at an intersection of the two bus lines, a pixel electrode connecting to the thin-film transistor, and a Cs bus line that forms an electrical capacitance to the pixel electrode;

15 forming a liquid crystal layer by filling a liquid crystal composition, containing a photosensitive material, into a gap between the first substrate and the second substrate;

forming an electrical capacitance by the common electrode and the pixel electrode by sandwiching the liquid crystal layer therebetween; and

20 radiating light to the liquid crystal layer while applying an AC voltage between the common electrode and the pixel electrode by applying AC voltages to the common electrode and the Cs bus line.

25 2. A method of fabricating a liquid crystal display device as described in claim 1, wherein the common electrode and the Cs bus line are insulated from each other or connected via high resistance when radiating the light to the liquid crystal layer.

30 3. A method of fabricating a liquid crystal display device, comprising:

forming on a first substrate a common electrode for applying a voltage over an entire surface of the substrate;

35 forming on a second substrate a gate bus line and a data bus line arranged in a matrix array, a thin-film transistor located at an intersection of the two bus lines, a pixel electrode connected to the thin-

film transistor, and a Cs bus line that forms an electrical capacitance with the pixel electrode;

forming a liquid crystal layer by filling a liquid crystal composition, containing a photosensitive material, into a gap between the first substrate and the second substrate;

forming an electrical capacitance using the common electrode and the pixel electrode by sandwiching the liquid crystal layer therebetween;

insulating the common electrode from the three bus lines, or connecting the common electrode to the three bus lines via high resistance; and

radiating light onto the liquid crystal layer while applying a DC voltage between the common electrode and the pixel electrode by applying a DC voltage between the common electrode and the three bus lines (the gate bus line, the data bus line, and the Cs bus line) formed on the second substrate.

4. A method of fabricating a liquid crystal display device, comprising:

forming on a first substrate a common electrode for applying a voltage over an entire surface of the substrate;

forming on a second substrate a gate bus line and a data bus line arranged in a matrix array, a thin-film transistor located at an intersection of the two bus lines, a pixel electrode connecting to the thin-film transistor, a Cs bus line that forms an electrical capacitance to the pixel electrode, and a repair line intersecting with at least one of the data bus and gate bus lines;

forming a liquid crystal layer by filling a liquid crystal composition, containing a photosensitive material, into a gap between the first substrate and the second substrate;

forming an electrical capacitance using the common electrode and the pixel electrode by

sandwiching the liquid crystal layer therebetween; and  
radiating light onto the liquid crystal  
layer while applying a DC voltage between the common  
electrode and the pixel electrode by applying a DC  
5 voltage between the common electrode and the four bus  
lines (the gate bus line, the data bus line, the Cs bus  
line, and the repair line) formed on the second  
substrate.

10 5. A method of fabricating a liquid crystal  
display device, comprising:

forming on a first substrate a common  
electrode for applying a voltage over an entire surface  
of the substrate;

15 forming on a second substrate a gate bus  
line and a data bus line arranged in a matrix array, a  
thin-film transistor located at an intersection of the  
two bus lines, a pixel electrode connecting to the thin-  
film transistor, and a Cs bus line that forms an  
electrical capacitance to the pixel electrode;

20 forming a liquid crystal layer by filling  
a liquid crystal composition, containing a photosensitive  
material, into a gap between the first substrate and the  
second substrate;

25 forming an electrical capacitance using  
the common electrode and the pixel electrode by  
sandwiching the liquid crystal layer therebetween; and

connecting the common electrode via high  
resistance to the three bus lines (the gate bus line, the  
data bus line, and the Cs bus line,) formed on the second  
30 substrate, and radiating light onto the liquid crystal  
layer while applying a DC voltage between the common  
electrode and the pixel electrode by applying a DC  
voltage between the common electrode and at least one of  
the bus lines.

35 6. A method of fabricating a liquid crystal  
display device, comprising:

forming on a first substrate a common

electrode for applying a voltage over an entire surface of the substrate;

forming on a second substrate a gate bus line and a data bus line arranged in a matrix array, a thin-film transistor located at an intersection of the two bus lines, a pixel electrode connecting to the thin-film transistor, and a Cs bus line that forms an electrical capacitance to the pixel electrode;

forming a CF resin or a light blocking pattern on a channel portion of the thin-film transistor;

forming a liquid crystal layer by filling a liquid crystal composition, containing a photosensitive material, into a gap between the first substrate and the second substrate;

forming an electrical capacitance using the common electrode and the pixel electrode by sandwiching the liquid crystal layer therebetween;

electrically connecting adjacent data bus lines at both ends thereof; and

radiating light onto the liquid crystal layer while applying an AC voltage between the common electrode and the pixel electrode by applying a transistor ON voltage to the gate bus line and an AC voltage between the common electrode and the data bus line.

7. A method of fabricating a liquid crystal display device, comprising:

forming on a first substrate a common electrode for applying a voltage over an entire surface of the substrate;

forming on a second substrate a gate bus line and a data bus line arranged in a matrix array, a thin-film transistor located at an intersection of the two bus lines, a pixel electrode connecting to the thin-film transistor, a Cs bus line that forms an electrical capacitance to the pixel electrode, and a repair line intersecting with the data bus line;

forming a CF resin or a light blocking pattern on a channel portion of the thin-film transistor;

forming a liquid crystal layer by filling a liquid crystal composition, containing a photosensitive material, into a gap between the first substrate and the second substrate;

forming an electrical capacitance using the common electrode and the pixel electrode by sandwiching the liquid crystal layer therebetween;

connecting at least one data bus line with at least one repair line by laser radiation or another method; and

radiating light onto the liquid crystal layer while applying an AC voltage between the common electrode and the pixel electrode by applying a transistor ON voltage to the gate bus line and an AC voltage between the common electrode and the data bus line and repair line (the repair line is at the same potential as the data bus line).

8. A method of fabricating a vertical alignment liquid crystal display device, comprising:

forming a liquid crystal layer by filling a liquid crystal composition into a gap between two substrates each having a transparent electrode and an alignment control film for causing liquid crystal molecules to align vertically, the liquid crystal composition having a negative dielectric anisotropy and containing a polymerizable monomer; and

polymerizing the monomer while applying a voltage between opposing transparent electrodes, and thereby providing a pretilt angle to the liquid crystal molecules, and wherein:

before polymerizing the monomer, a constant voltage not smaller than a threshold voltage but not greater than a saturation voltage is applied between the opposing transparent electrodes for a predetermined period of time, and thereafter, the voltage is changed to

a prescribed voltage and, while maintaining the prescribed voltage, ultraviolet radiation or heat is applied to the liquid crystal composition to polymerize the monomer.

5           9. A method of fabricating a liquid crystal display device, comprising:

                    forming a liquid crystal layer by filling a liquid crystal composition containing a polymerizable monomer into a gap between two substrates each having a transparent electrode; and

10                      polymerizing the monomer while applying a voltage between opposing transparent electrodes, and thereby providing a pretilt angle to liquid crystal molecules while, at the same time, controlling the direction in which the liquid crystal molecules tilt in the presence of an applied voltage, and wherein:

                    light radiation for polymerizing the polymerizable monomer is performed in at least two steps.

20           10. A liquid crystal display device in which a liquid crystal composition containing a photopolymerizable or thermally polymerizable component is sandwiched between substrates and the polymerizable component is polymerized while applying a voltage, thereby defining the direction in which liquid crystal molecules tilt in the presence of an applied voltage, wherein a plurality of injection ports for injecting therethrough the liquid crystal composition containing the polymerizable component are formed in one side of the liquid crystal display device, and the spacing between the respective injection ports is not larger than one-fifth of the length of the side in which the injection ports are formed.

25           11. A liquid crystal display device in which a liquid crystal composition containing a photopolymerizable or thermally polymerizable component is sandwiched between substrates and the polymerizable component is polymerized while applying a voltage,

thereby defining the direction in which liquid crystal molecules tilt in the presence of an applied voltage, wherein the cell gap in a frame edge BM area is not larger than the cell gap of a display area.

5           12. A liquid crystal display device in which a liquid crystal composition containing a photopolymerizable or thermally polymerizable component is sandwiched between substrates and the polymerizable component is polymerized while applying a voltage,  
10           thereby defining the direction in which liquid crystal molecules tilt in the presence of an applied voltage, wherein a main seal or an auxiliary seal is formed in a frame edge BM area to eliminate the cell gap in the frame edge BM area.

15           13. A liquid crystal display device in which a liquid crystal composition containing a photopolymerizable or thermally polymerizable component is sandwiched between substrates and the polymerizable component is polymerized while applying a voltage,  
20           thereby defining the direction in which liquid crystal molecules tilt in the presence of an applied voltage, wherein an auxiliary seal is formed so that a material, whose concentration of the polymerizable material relative to liquid crystal is abnormal, is guided into a  
25           BM area.

          14. A method of fabricating a liquid crystal display device, comprising:

                          forming a common electrode and a color filter layer on a first substrate;

30                        constructing a second substrate from an array substrate on which are formed a gate bus line layer, a gate insulating film layer, a drain bus line layer, a protective film layer, and a pixel electrode layer;

35                        forming fine slits in the pixel electrode layer in such a direction that a pixel is divided by the slits into at least two sub-regions;

forming on each of the two substrates a vertical alignment film for vertically aligning liquid crystal molecules;

5       forming a liquid crystal layer by filling an n-type liquid crystal composition having a negative dielectric anisotropy into a gap between the two substrates, the liquid crystal composition containing an ultraviolet curable resin having a liquid crystal backbone;

10       radiating ultraviolet light while applying to the liquid crystal molecules a voltage not smaller than a threshold value of the liquid crystal molecules, thereby defining the direction in which the liquid crystal molecules tilt in the presence of an applied  
15       voltage; and

arranging two polarizers on top and bottom surfaces of the liquid crystal display device in a crossed Nicol configuration with the absorption axes thereof oriented at an angle of 45 degrees to the  
20       alignment directions of the liquid crystal molecules.

15. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, and a pretilt angle of liquid crystal molecules and a tilt direction thereof in  
25       the presence of an applied voltage are controlled by using a polymer that polymerizes by heat or light radiation, wherein any portion where the cell thickness varies by 10% or more due to design constraints is located at a liquid crystal domain boundary.

30       16. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, and a pretilt angle of liquid crystal molecules and a tilt direction thereof in the presence of an applied voltage are controlled by  
35       using a polymer that polymerizes by heat or light radiation, wherein a contact hole that connects between a source electrode and a pixel electrode is formed at a



liquid crystal domain boundary.

17. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, and a pretilt angle of liquid crystal molecules and a tilt direction thereof in the presence of an applied voltage are controlled by using a polymer that polymerizes by heat or light radiation, wherein a contact hole that connects between a Cs intermediate electrode and a pixel electrode is formed at a liquid crystal domain boundary.

18. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, a pretilt angle of liquid crystal molecules and a tilt direction thereof in the presence of an applied voltage are controlled by using a polymer that polymerizes by heat or light radiation, and liquid crystal alignment is divided between two or more sub-regions, wherein more than one portion where cell thickness varies by 10% or more due to design constraints does not exist.

19. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, a pretilt angle of liquid crystal molecules and a tilt direction thereof in the presence of an applied voltage are controlled by using a polymer that polymerizes by heat or light radiation, and liquid crystal alignment is divided between two or more sub-regions, wherein more than one contact hole is not formed in the same sub-region.

20. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, and a pretilt angle of liquid crystal molecules and a tilt direction thereof in the presence of an applied voltage are controlled by using a polymer that polymerizes by heat or light radiation, wherein a pixel electrode, a source electrode, and a Cs intermediate electrode are connected by a single

contact hole.

21. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, and a pretilt angle of liquid crystal molecules and a tilt direction thereof in the presence of an applied voltage are controlled by using a polymer that polymerizes by heat or light radiation, wherein a metal electrode is added along a liquid crystal domain boundary within a display pixel.

22. A liquid crystal display device in which a liquid crystal layer is sandwiched between a pair of substrates having electrodes, and a pretilt angle of liquid crystal molecules and a tilt direction thereof in the presence of an applied voltage are controlled by using a polymer that polymerizes by heat or light radiation, wherein an electrode having the same potential as a pixel electrode is not added to a slit portion of the pixel electrode within a display pixel.

23. A method of fabricating a liquid crystal display device, comprising: forming a liquid crystal layer by filling a liquid crystal composition containing a polymerizable monomer into a gap between a pair of substrates having electrodes; and polymerizing the monomer by radiating ultraviolet light to the liquid crystal composition while applying a prescribed liquid crystal driving voltage between opposing electrodes, and wherein: after polymerizing the monomer, additional ultraviolet radiation is applied to the liquid crystal composition without applying the liquid crystal driving voltage or while applying a voltage of a magnitude that does not substantially drive the liquid crystal.